REMARKS

Claims 1-7 and 12-17 are in this application and are presented for consideration. Claims 2-4 have been amended, claims 8-11 have been canceled and new claims 12-17 have been added.

The claims have been amended to improve the style of this application, to address the Examiner's rejections, incorporate the Examiner's suggestions, and to further highlight and more clearly point out the important features of the invention. Applicant thanks the Examiner for providing suggestions.

Claim 7 has been rejected due to the phrase "the control algorithm" having insufficient antecedent basis. Applicant notes that claim 7 depends from claim 4 and original claim 4 set forth "a control algorithm" in line 5.

The original claims have been rejected as either being anticipated by Dietze or obvious over Dietze in view of Patko.

With this amendment Applicant has added new independent claim 12. This claim sets forth a sensor array with a plurality of measuring heads connected by a digital interface designed as a bus system. Support for this can be found in the present specification on page 6, lines 10-12. New independent claim 12 also sets forth a central unit connected to the digital interface. Support for this can be found in the specification on page 9, line 21 and page 10, line 1.

Each measuring head has a sensor array and an operating electronic unit. The operating electronic unit includes a digital to analog converter, and analog to digital converter, and a

microprocessor all integrated on a single chip. The microprocessor runs a control algorithm which operates the analog to digital converter and the digital to analog converter to form a potentiostat. Applicant has found that it is very convenient and advantageous to operate a sensor arrangement as set forth in new independent claim 12.

Applicant has reviewed the applied prior art, and finds no teaching nor suggestion of connecting a plurality of measuring heads through a network bus system to a central unit, especially where each of the measuring heads has an analog to digital converter, a digital to analog converter and a microprocessor on a single chip, where these devices form a potentiostat. Therefore claim 12 defines over the prior art.

It is Applicant's position that there is no suggestion or motivation which would lead a person of ordinary skill in the art to modify the prior art to create the sensor arrangement of claim 12. Applicant notes that the prior art appears to relate to hand held devices which have two parts, namely an analysis element and an evaluation unit in the case of Dietze, or a sample receptacle and a sensor data reader in Patko. The present invention on the other hand relates to the field of measuring extended areas with a plurality of measuring heads, such as a processing plant, where the air quality in different parts of the plant needs to be continuously measured and monitored from a central location. As Applicant has described in the beginning of the specification, accurately measuring substance concentrations at a plurality of positions and reporting these to a central point can be difficult to do, especially when high accuracy is required at a reasonable cost. Applicant has found that when each of the measuring heads has a potentiostat formed by A/D and D/A converters controlled by a microprocessor, and where

a digital network interface is connected to the microprocessor, a plurality of these measuring heads can be easily connected to a central unit, at a reasonable cost, and that the accuracy of each of the measuring heads is very high. This is especially true when the microprocessor in each measuring head can repetitively measure parameters of the measuring head and adjust operation of the measuring head. This feature is further set forth in new claim 16, and present claim 3.

Applicant notes that the reference of Patko would not lead a person of ordinary skill in the art to a sensor arrangement where measuring heads are at spaced locations from each other, and a central unit repetitively monitors the measuring heads. Instead Patko leads a person of ordinary skill in the art to diagnostic devices which are disposable, and are only to be used once. The person of ordinary skill in the art would therefore not be lead to use such diagnostic devices in a sensor arrangement which would be used in a processing plant for repetitively monitoring air quality. Therefore Patko cannot cause claim 12 to be obvious.

Claims 13, 14 and 15 set forth further features of the connection between a plurality of measuring heads and the network bus system. Since the prior art does not describe a network bus system, claims 13, 14 and 15 therefore further define over the prior art.

Claim 1 sets forth a potentiostat circuit which is a digital control circuit whose controller function is controlled by the microprocessor. Applicant notes that a potentiostat circuit maintains the voltage between two electrodes in a sensor constant, usually by varying the current in a third electrode of a sensor. The rejection equates element 45 and column 6 lines 8 - 15 of Dietze with the potentiostat circuit of claim 1. Applicant has reviewed Dietze,

especially with regard to Fig. 3, and notes that element 45 is a digital-to-analog device. The text of Dietze describes element 45 as a voltage source. Furthermore, column 6 lines 8 - 15 of Dietze describes measuring a current at a defined voltage of the voltage source 45. This measured current is used to measure the resistance between contacts which is compared to a limit value which is stored in a calibration store 37. Applicant finds no teaching nor suggestion that element 45, or column 6 lines 8 - 15 describes a potentiostat circuit. Instead element 45 appears to be a voltage source based on a digital-to-analog converter, and column 6 lines 8 - 15 only describes measuring the resistance using current from the voltage source and then using the current to determine resistance which is compared to a calibration value. Neither of these portions of Dietze indicates that a potentiostat circuit is present, or that the function of a potentiostat circuit is present. Applicant finds no measuring of a voltage between two electrodes, and then adjusting a third electrode to maintain the voltage constant. Therefore the portions of Dietze used to anticipate the potentiostat circuit of claim 1 are untenable. Claim 1 therefore overcomes the anticipation rejection in view of Dietze.

Claim 4 also sets forth a potentiostat circuit, and sets forth that the potentiostat circuit is formed by analog-to-digital converter, and a digital-to-analog converter. And that these are controlled by a microprocessor to form a potentiostat circuit. Applicant has reviewed Dietze, especially the portions with regard to the rejection of claim 4. Applicant finds no teaching in Dietze that a microprocessor controls a digital-to-analog converter and an analog-to-digital converter to form a potentiostat circuit. Therefore it is Applicant's position that claim 4 also defines over Dietze.

New claim 16 sets forth that each measuring head includes a memory storing parameters of the respected measuring head. The control algorithm of the respected measuring head uses those parameters to operate the operating unit. The microprocessor in the measuring head repetitively measures and updates the parameters and stores these parameters in the memory. Support for this can be found in the present specification on page 5, line 14 through page 6, line 6 and page 7 lines 5-10. Original claims 2 and 3 set forth a memory with operating parameters. These claims have been rejected as being obvious over Dietze in view of Patko.

The reference of Patko has been used to teach a memory with stored operating parameters and a microprocessor reading parameters from the memory to carry out a control algorithm. The rejection states that it would have been obvious to modify Dietze by these teachings of Patko, because this will allow the sensor to be prevented from being used again. Applicant notes that preventing a sensor from being used again, would be counter to perform the test functions at regular intervals and adapting the control algorithm to the same. Therefore it is Applicant's position that Patko does not provide the incentive to modify Dietze and cause the parameter of the present invention to be obvious.

Claim 16 sets forth that the parameters used to operate the operating unit are repetitively measured and updated and stored in the memory. Applicant has reviewed Patko, and finds no teaching nor suggestion of measuring parameters, updating parameters and storing the parameters in memory. Applicant finds that Patko in column 5 describes storing data such as the initial efficiency, the rate of decay and the date of manufacture. Patko also later describes storing and ion concentration which is known at the time of manufacture. None of

this stated in Patko while measured by microprocessor in a measuring head. Therefore this date does not anticipate the parameters of claim 16.

Patko also describes measuring an electrical potential to determine the position of point "L,A" in column 5 and in the end of the column 11 in the beginning of column 12. However Applicant finds no teaching nor suggestion in Patko that this electricl potential is stored in a memory. Applicant finds further no teaching nor suggestion that this measured potential is updated. Applicant notes that in order for the measured potential to be updated, a previous value must have been taken, stored and then updated. Applicant finds no teaching nor suggestion of this particular arrangement in Patko, and therefore the measured potential in Patko cannot anticipate the features of claim 16. Applicant finds no teaching nor suggestion of any other structure in Patko which would anticipate the parameters of claim 16. Claim 16 therefore cannot be considered obvious in view of the combination of Dietze and Patko.

Claims 3 and 7 also describe operating parameters, and these claims indicate that the operating parameters are determined by performing test functions at regular intervals. Applicant notes that the official efficiency, the rate of decay and the date of manufacture in column 5 of Patko are not determined by performing test functions at regular intervals. Therefore this data of Patko does not anticipate the operating parameters of claims 3 and 7.

Claims 3 and 7 both depend from claims which indicate that the operating parameters are stored in a memory. The measured potential of Patko cannot anticipate the operating parameters of claims 3 and 7, since the measured potential of Patko is not stored in their memory. Claims 3 and 7 therefore also define over the combination of Dietze and Patko.

The storing of the measured parameters is a beneficial feature of the present invention. The measuring heads of the present invention are able to calibrate themselves which is especially useful when a large number of measuring heads are provided, and these measuring heads are spread out over a large area such as a factory floor. It is further advantageous for the operating parameters to be stored and measured in the individual measuring heads when the sensing is to be performed over a long period of time. Applicant also notes that because these parameters are stored in the measuring head, and the measuring heads are networked together, it would be possible for the central unit to read these parameters. An operator of the overall arrangement could then determine if a particular measuring head is failing or may be close to failing. The operator could then estimate the life remaining in the sensors and plan accordingly for their replacement.

The present invention is an improvement of the prior art, in that individual measuring heads can be easily and inexpensively provided at a plurality of spaced locations, especially to monitor air quality in a processing plant. The microprocessor, and A/D and D/A converters forming potentiostats on a single chip, make the individual measuring heads very inexpensive, and at the same time make them very accurate. The digital network interface being connected to the microprocessor, allows the individual measuring heads to be easily connected to a network bus system which reduces wiring expense, and still maintains the accuracy of the sensors. The present invention is therefore able to provide a sensor arrangement which can easily, efficiently, and accurately monitor a large location from a single central point. The

present invention is therefore an improvement over the prior art, and Applicant respectfully requests patent protection for this improvement.

If the Examiner has any comments or suggestions which would further favorable prosecution of this application, the Examiner is invited to contact Applicant's representative by telephone to discuss possible changes.

At this time, Applicant respectfully requests reconsideration of this application, based on the above amendments and remarks, and respectfully solicits allowance of this application.

Respectfully submitted
for Applicant,

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Enclosure: New Figure 4
70280.8

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